

Modern Concepts of Cardiovascular Disease

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SOME RECENT ADVANCES IN THE STUDY OF THE EPIDEMIOLOGY OF RHEUMATIC FEVER

Although our knowledge of the epidemiology of rheumatic fever is still fragmentary and incomplete, it is generally recognized that this disease constitutes an important public health problem involving broad segments of our population. It is believed that almost all deaths from heart disease between the ages of five and twenty-four are due to rheumatic cardiac injury and such data have frequently been utilized as a crude index of the extent to which rheumatic fever may be encountered. Despite the fact that vital statistics both in this country and Great Britain¹ tend to confirm the widespread clinical impression that the active and more dramatic manifestations of rheumatic fever have become milder and the disease in childhood less likely to terminate fatally, deaths attributed to rheumatic heart disease exceed those caused by all other diseases during the school age period and are surpassed in number in young adult life only by those due to tuberculosis. Moreover, there is impressive evidence to indicate that rheumatic heart disease is responsible for even a larger number of deaths after maturity is reached than in earlier life.

During recent years, the work of numerous investigators has greatly extended our knowledge of the clinical nature of rheumatic fever and the wide variation in pattern through which its course may run. Accordingly, with more accurate diagnosis, greater awareness of the often insidious development of cardiac injury and increased recognition of the chronic illness and disability caused by the rheumatic process, so large a number of living persons have been found to be victims of this disease that there is ample justification for intensified study of its epidemiology in order that practical measures may be formulated for its eventual prevention and control.

Paul has recently reviewed and summarized the available data bearing upon the epidemiology of rheumatic fever.² Among the many topics discussed in detail in this valuable monograph, considerable attention has been devoted to the current need for the expansion of community resources for the diagnosis, treatment, and rehabilitation of rheumatic individuals and to the lines along which public health procedures may develop with regard to this disease. It is clearly apparent that the establishment of sound programs depends in part upon the satisfactory analysis of the various factors influencing the occurrence of rheumatic fever and its distribution among different population groups. Numerous efforts have been made to evaluate its social, economic and racial selection and the effect of geographic location, dampness, inadequate housing and nutrition. Though there is almost universal agreement that poverty and an unhygienic environment may influence unfavorably the course and prognosis of rheumatic fever,³ more accurate and comparable measurements of the incidence and prevalence of this disease are needed in order to resolve the many conflicting and contradictory opinions which have been presented.

The British have pioneered in the development of comprehensive public health programs for the study and treatment of rheumatic fever, and the best known of these programs is that of the Rheumatism Scheme of the London County Council.⁴ This plan, based upon the voluntary referral of cases of childhood rheumatic fever by private physicians, hospitals and dispensaries, school physicians and other medical agencies, not only maintains a central registry of all diagnosed cases but also assures the necessary facilities for early diagnosis, adequate hospital care during acute illness and of very great importance, ample provision for suitable accommodations to permit prolonged convalescence. Subsequent to discharge from these convalescent units, medical supervision and guidance is continued through special centers which integrate and coordinate all services available to rheumatic patients. It is unfortunate that wartime conditions have curtailed and interrupted this project, but its influence has already been reflected by the development of similar, though less comprehensive, programs elsewhere. In this country, nine states (Arizona, California, Illinois, Iowa, Maryland, Michigan, Rhode Island, Utah and Wyoming), the District of Columbia and two large cities, Chicago and Cincinnati, have made rheumatic fever a reportable condition. In addition, some seventeen states have recently established programs for the care of children suffering from this disease. These state plans, conducted at present on a very modest scale, have been aided by funds provided through the United States Children's Bureau and made available for services to crippled children under the Social Security Act.

Experience has shown that no successful program can be established or maintained without broad community interest and support on the part of both the medical profession and the general population. Greater support may be expected to be forthcoming in the near future in view of the prominent role that rheumatic fever has played in the physical disqualification of urgently needed manpower for the armed forces.

Among the first two million men between the ages of 21 and 36 examined under the Selective Service System, almost 100,000 were found unfit for military service because of cardiovascular disease.⁵ On the basis of careful reexamination of samples of rejected men made by leading cardiologists in five large cities in the United States, it was found that fully half of the disqualifying cardiovascular conditions were due to rheumatic valvular defects.⁶ If such findings can be considered as representative of the nation as a whole, rheumatic fever alone has reduced the potential strength of our military forces by approximately 2.5 per cent and has accounted for almost five per cent of all causes of rejection. Although experience varied widely in different cities, only about one quarter of those showing definite evidence of rheumatic heart disease could provide a history of previous rheumatic symptoms.

For obvious reasons, the above data serve only as a crude index of the prevalence of rheumatic cardiac defects even in the age group from which the nation is deriving its fighting strength. These findings emphasize, however, that this disease cannot be considered as one limited to childhood and one in which attention may be restricted to those active and relatively dramatic phases when fever, polyarthritis, carditis and chorea are most likely to occur. It is true that measures taken subsequent to the development of permanent cardiac injury are essentially limited to palliation, restriction of further cardiac damage and the readjustment of the patients' way of life to conform with impaired functional capacity and if prevention of the disease and the mitigation of illness, disability and premature death are our ultimate goal, attention must be focused upon the childhood period when such efforts will be most productive.

Rheumatic fever has also gained attention as a disease of military importance as the result of its epidemic occurrence among recruits and troops in training camps and barracks. Although encountered in this form in the last war and observed during the intervening years in hospitals, schools, institutions and even in circumscribed communities, current experience has not only served to recall attention to this phase of the problem but has provided unusual opportunities for further investigation of its epidemiological association with Group A hemolytic streptococcal infections.

Recent studies have been greatly facilitated by the extensive utilization and the refinements in technique of the serological methods introduced by Lancefield and Griffith for the identification and classification of hemolytic streptococci. By such means it has become increasingly apparent that the milder and often undetected forms of streptococcal infection such as tonsillitis and pharyngitis as well as scarlet fever and septic sore throat frequently precede epidemics of active rheumatic fever. In fact, if both bacteriological and immunological procedures are utilized, the proportion of antecedent streptococcal infections, many of them completely subclinical, will be even more strikingly increased. It has been observed that these secondary waves of rheumatic fever do not invariably occur after every epidemic of streptococcal infection, but when a given strain demonstrates its ability to initiate rheumatic activity, the number of cases of rheumatic fever which do develop roughly parallels the volume of streptococcal infection experienced by the group.

Among relatively small groups of previously apparently healthy individuals in semi-enclosed environments, reports indicate that as high as sixteen per cent of those contracting streptococcal respiratory infections have subsequently developed active rheumatic fever. When persons with a history of relatively recent recovery from an active rheumatic episode, such as patients confined in convalescent homes, are similarly affected, the incidence of recurrences frequently exceeds fifty per cent.³ Green has observed that in a number of large military establishments in Great Britain, rheumatic fever has occurred in approximately five per cent of those young recruits known to have experienced antecedent streptococcal infections⁴ and preliminary surveys among our own military personnel appear to confirm these findings. Of interest is the fact that a relatively high proportion of those who develop rheumatic fever in such military outbreaks can give a suggestive history of previous rheumatic episodes in childhood even though no definite evidence of residual rheumatic stigmata can be detected.

It is not yet possible to apply these observations to the sequence of events in the development of rheumatic fever among persons residing in civilian populations at large. Nevertheless, there is little reason to believe that streptococcal infections occurring in confined environments differ from those in open communities except that crowding and more intimate personal contact undoubtedly accounts for a higher incidence of infection. In addition, it has

been demonstrated that the ability to precipitate initial or recurrent episodes of rheumatic fever is not restricted to any specific Griffith type or types of Group A hemolytic streptococcus. Many distinct strains of this almost ubiquitous organism may possess the "rheumatogenic" property and host factors, at present poorly understood, possibly play the determining role in selecting those who will develop rheumatic fever.

Wilson and her collaborators⁵ have intensively studied this important factor of individual susceptibility. Their conclusions are based upon more than twenty-five years of careful clinical observation of members of families in which rheumatic fever is known to have occurred. These genetic studies, unique in the epidemiological investigation of human disease, strongly suggest that susceptibility to the rheumatic process is an inheritable characteristic dependent upon a single autosomal recessive gene. Although these studies require additional confirmation, they provide reasonable explanation for many long-standing observations on the familial aggregation of cases of rheumatic fever which hitherto have been difficult to account for on a purely communicable disease basis.

Intimately associated with the hemolytic streptococcus hypothesis of the causation of this disease is the accumulated evidence of successful sulfonamide prophylaxis against rheumatic fever. Although these drugs are generally considered ineffective and even contraindicated in treatment during periods of rheumatic activity, they not only appear to prevent the occurrence of upper respiratory infections due to Group A strains of this organism, but also strikingly reduce the frequency of rheumatic recurrences when given to rheumatic subjects while the process is quiescent.⁶ Worthy of note is the fact that a number of workers have reported that once the streptococcal infection becomes established, the administration of sulfonamides may fail to prevent the recurrence of rheumatic activity.

At present this measure of prophylaxis is feasible from an epidemiological point of view only among those persons known to be particularly susceptible to rheumatic recurrences because of relatively recent previous attacks. Because of the precautions necessary to avoid harmful effects among those taking sulfonamide drugs, the definite danger of developing sulfonamide fast strains of hemolytic streptococci and our present inability to identify persons likely to experience their first attack, the widespread utilization of this form of chemoprophylaxis cannot be advocated at present for the population as a whole. Under military conditions where the likelihood of epidemics of streptococcal upper respiratory infections is increased and careful supervision of those receiving these drugs is possible, such procedures may be warranted.

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BIBLIOGRAPHY:

1. Glover, A.: Wartime Decline of Acute Rheumatism, *Lancet*, 245:51-52, 1943
2. Paul, J. R.: *The Epidemiology of Rheumatic Fever and Some of Its Public Health Aspects*, 2nd Edition, American Heart Association, N. Y., 1943
3. Morris, J. N. and Titmus, R. M.: *Epidemiology of Juvenile Rheumatism*, *Lancet*, 243:59-63, 1942
4. Bach, F., Hill, N. G., Preston, T. W., and Thornton, G. E.: Juvenile Rheumatism in London. *Ann. Rheum. Dis.* 1:210-241, 1939
5. Rountree, L. G.: *Rehabilitation and Prehabilitation*, *J.A.M.A.* 119:1171-1175, 1942
6. Levy, R. L., Stroud, W. D., and White, P. D.: Report of Reexamination of 4984 Men Disqualified for General Military Service, *J.A.M.A.* 123:937-944, 1943; 1029-1035, 1943
7. Green, C. A.: Epidemiology of Hemolytic Streptococcus Infection in Relation to Acute Rheumatism, *Journal of Hygiene*, 42:365-392, 1942
8. Wilson, M. G., Schweitzer, M.D. and Lubscher, R.: The Familial Epidemiology of Rheumatic Fever: Genetic and Epidemiological Studies, *Journal of Pediatrics*, 22:468-492, 1943; 581-611, 1943
9. Kuttner, A. G.: Prevention of Rheumatic Recurrences, *N. Y. State Journal of Medicine* 48:1941-1947, 1943

